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APPLICATION FOR LETTERS PATENT FOR:

MOUNTING DEVICE AND METHOD FOR ATTACHING AN ELECTRONIC  
TOLL PASS ASSEMBLY TO A VEHICLE WINDSHIELD

This Application is a C-I-P of Copending Application No.  
10/098,725

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**MOUNTING DEVICE AND METHOD FOR ATTACHING AN ELECTRONIC  
TOLL PASS ASSEMBLY TO A VEHICLE WINDSHIELD**

5        **RELATED APPLICATIONS**

          This application is a continuation-in-part of  
U.S. Patent Application Serial No. 10/098,725,  
entitled Device And Method For Supporting An  
Electronic Toll Pass Assembly Against The Windshield  
10      Of A Vehicle, filed March 18, 2002.

**BACKGROUND OF THE INVENTION**

1.      Field Of The Invention

15        The present invention relates to electronic toll  
payment passes that are used to automatically pay a  
toll as a vehicle passes through a tollbooth. More  
particularly, the present invention relates to devices  
and methods that are used to mount electronic toll  
20      payment passes against the windshield of a vehicle so  
it can be read at a tollbooth.

## 2. Prior Art Statement

In the past, when a vehicle passed through a tollbooth, the driver of the vehicle had to stop the vehicle and pay a toll. This disrupts the regular flow of traffic. If heavy traffic is present on the toll road, it is not uncommon for large traffic backups to exist approaching a toll plaza, as each vehicle prepares to stop and pay the toll. In attempts to better increase traffic flow, different traffic authorities have tried many different ways to decrease the amount of time a vehicle spends stopped at a tollbooth. If the amount of time per vehicle can be decreased, the traffic congestion can likewise be decreased.

One way to decrease the amount of time a vehicle spends at a tollbooth is to install coin toss buckets in some of the tollbooths. Coin toss buckets are commonly used on toll roads that have small tolls. Coin toss buckets enable a driver of a vehicle to pay a toll simply by throwing the money for the toll into a collection bucket that quickly counts the money to determine if the proper toll has been paid. However,

if a toll is in excess of one dollar, coin toss  
buckets become impractical since few people carry  
enough coins to pay the toll. Many traffic authorities  
have also tried coupon books. Coupon books are bought  
5 by the driver of a vehicle. Each coupon in the book is  
good for one passage through the toll. As such, a toll  
collector need only collect the coupon without having  
to receive money and make change. The time savings  
with the use of coupons is nominal. Accordingly, the  
10 use of coupons does not have a significant effect on  
traffic patterns at tollbooths.

Electronic toll payment passes are the first true  
solution to reducing traffic congestion problems at  
tollbooths. Electronic toll payment passes are  
15 electronic transceivers that contain a coded customer  
number. Owners of vehicles open credit accounts and  
receive an electronic toll payment pass with a unique  
customer identification code. The electronic toll  
payment pass is mounted against the inside of a  
20 vehicle's windshield. When the vehicle passes through  
a toll booth, the electronic toll payment pass is  
automatically activated, wherein the electronic toll

payment pass transmits its customer code. A receiver within the tollbooth reads the transmitted customer code and debits the price of the toll against the account having that customer code.

5        Since the use of electronic toll payment passes consists of nothing more than the exchange of electronic data, vehicles having electronic toll payment passes do not have to stop. They need only pass through the tollbooth. For the sake of safety,  
10       however, many tollbooths place speed limits on how fast a vehicle with an electronic toll payment pass can pass through the tollbooth without stopping.

15       Typically, electronic toll payment passes are provided with two strips of hook and loop material that adhesively mount to the windshield of the vehicle. The housing of the electronic toll payment pass also has two strips of hook and loop material that can be selectively joined to the hook and loop strips on the windshield. This retains the electronic  
20       toll payment pass in place against the windshield, yet provides the ability to quickly remove the device from the windshield when the vehicle is left unattended.

There are certain disadvantages to electronic toll payment passes. When an electronic toll payment pass is mounted onto the interior of a windshield, the base of the electronic toll payment pass is visible through the glass of the windshield. This enables thieves to quickly determine if an electronic toll payment pass has been left within a vehicle. The visibility of the electronic toll payment pass also detracts from the aesthetic value of the vehicle.

In the prior art, there have been devices that are designed to hold electronic toll payment passes in place. These prior art devices typically consist of some type of bracket that holds the electronic payment pass against the back of a vehicle's sun visor. As such, the sun visor must be lowered each time the vehicle passes through a tollbooth, in order to bring the electronic toll payment pass within close proximity of the windshield. With many makes of vehicles, the sun visor does not turn flush with the interior of the windshield. In such model vehicles, the electronic toll payment pass cannot be mounted to

the sun visor because it may not be properly positioned to operate in a tollbooth.

A need therefore exists for a system and method of retaining an electronic toll payment pass in place against the interior of a windshield in a manner that both prevents the electronic toll payment pass from being readily seen and does not detract from the aesthetic appeal of the vehicle.

#### SUMMARY OF THE INVENTION

The present invention is a mounting device and method for mounting an electronic toll payment pass to the interior of a vehicle's windshield. The device is comprised of a flexible support substrate having a face surface and a back surface. The face surface of the flexible supports substrate is attached to the glass of the vehicle's windshield with either adhesive or double-sided tape. Once attached, the flexible support substrate conforms to the contoured shape of the windshield. The electronic toll payment pass is connected to the back surface of the flexible support substrate in a manner that allows the electronic toll

payment pass to be easily installed and removed by the driver of the vehicle.

When the electronic toll payment pass is attached to the flexible support substrate, the flexible support substrate is interposed between the glass of the windshield and the electronic toll payment pass. The flexible support substrate preferably contains a display image. The display image is visible through the glass of the windshield and obstructs the viewing of the electronic toll payment pass through the windshield. Consequently, when the flexible support substrate is in place, the presence or absence of the electronic toll payment pass cannot be readily determined by an observer outside the vehicle. Furthermore, when the electronic toll payment pass is present, the uninteresting appearance of the electronic toll payment pass is replaced with a selected aesthetically pleasing display image.

#### BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present invention, reference is made to the following



descriptions of exemplary embodiments thereof,  
considered in conjunction with the accompanying  
drawings, in which:

5           FIG. 1 is perspective view of the windshield of a  
vehicle against which the present invention mounting  
device is installed;

10           FIG. 2 is an exploded perspective view of a first  
exemplary embodiment of the present invention mounting  
device, shown with a section of windshield and an  
electronic toll payment pass;

15           FIG. 3 is an exploded perspective view of a  
second exemplary embodiment of the present invention  
mounting device, shown with a section of windshield  
and an electronic toll payment pass;

20           FIG. 4 is an exploded perspective view of a third  
exemplary embodiment of the present invention mounting  
device, shown with a section of windshield and an  
electronic toll payment pass; and

FIG. 5 is an exploded perspective view of a fourth exemplary embodiment of the present invention mounting device, shown with a section of windshield and an electronic toll payment pass.

#### DETAILED DESCRIPTION OF THE DRAWINGS

Although the present invention mounting device and method can be adapted for use with any electronic toll payment system, the illustrations show the present invention mounting shaped to receive the rectangular housing of the EZ Pass(TM) brand of electronic toll payment passes. Such a configuration is merely exemplary and it should be understood that different brand electronic toll payment passes are made with other housing shapes. The configuration of the present invention mounting device can be changed to accommodate those housing shapes.

Referring to Fig. 1, an exemplary embodiment of the present invention mounting device 10 is shown applied to the windshield 12 of an automobile. The

mounting device 10 can be mounted to any point on the interior of the windshield 12 where an electronic toll payment pass 14 is to be held. However, it is recommended that most electronic toll payment passes 14 be mounted onto the interior of the windshield 12 either above or behind the mounting of the rearview mirror. As such, the present invention mounting device 10 is shown mounted to the windshield 12 at such a recommended point.

10           The present invention mounting device 10 engages and retains an electronic toll payment pass 14. However, the mounting device 10 is opaque and presents a display image 16 towards the glass of the windshield 12. In this manner, a person looking at the windshield 12 cannot tell if the electronic toll payment pass 14 is in place. Furthermore, even if the electronic toll payment pass 14 is in place, it cannot be seen. Only the display image 16 is seen. In this manner a display image 16 can be selected that compliments the aesthetics of the vehicle. As will later be explained, the display image 16 can be either a set image or an interchangeable image.

It will be understood that the windshields of different models of automobiles and trucks have different shapes. Rarely is the interior surface of a windshield perfectly flat. Rather, the interior surface of a windshield follows a complex curvature that creates the designed shape of the overall windshield.

Referring to Fig. 2, an embodiment of the present invention mounting system 20 is shown having a set display image 22. The display image 22 is printed or adhered to the face surface 23 of a flexible support substrate 24. The flexible support substrate 24 is flexible enough so that it can readily conform to the curvature of the interior of the windshield 12 regardless to what curvature the windshield 12 may embody. The support substrate 24 is preferably a thin, flexible paperboard product. However, plastic substrates, such as vinyl, can also be used.

The display image 22 is printed or adhered to the flexible support substrate 24. The flexible support substrate 24 can optionally be laminated on one or both sides to provide better strength and durability

to the flexible support substrate 24. This is particularly useful if a paperboard substrate is used.

A clear adhesive is applied to all or part of the face surface 23 of the flexible support substrate 24.

5 The clear adhesive can be applied across the entire face surface 23, and thus across the display image 22. The adhesive is covered with a removable protective cover 26 that prevents the adhesive from drying. The protective cover 26 is removed to expose the adhesive  
10 and enable the flexible support substrate 24 to be adhesively attached to the inside of the vehicle's windshield 12.

Once the adhesive is exposed and the flexible support substrate 24 is pressed against the interior  
15 of the windshield 12, the flexible support substrate 24 conforms to the shape of the windshield and no gaps exist between the flexible support substrate 24 and the interior of the windshield 12.

A first set of hook and loop strips 28 are  
20 provided. The first set of hook and loop strips 28 attach to the back surface of the flexible support substrate 24 that faces in toward the interior of the

vehicle. The first set of hook and loop strips 28 can come preattached to the back surface of the flexible support substrate 24 or can come unattached for attachment by the installer. It will be understood that if the first set of hook and loop strips 28 are provided unattached to the flexible support substrate 24, the hook and loop strips 28 will have adhesively coated surfaces that enable them to be selectively applied to the flexible support substrate 24.

A second set of hook and loop fasteners 29 are provided. The second set of hook and loop fasteners 29 are adhesively attached to the housing of the electronic toll payment device 14 in positions that correspond to the positions of the first set of hook and loop strips 28 on the flexible support substrate 24.

With the second set of hook and loop fasteners 29 attached to the housing of the electronic toll payment pass 14, the electronic toll payment pass 14 can be selectively detached and reattached to the first set of hook and loop strips 28 on the back surface of the flexible support substrate 24. The housing of the

electronic toll pass 14 is flat. The flexible support substrate 24 conforms to the curvature of the interior of the windshield 12. When the housing of the electronic toll pass 14 is placed against the flexible support substrate 14 there will be contact only at discrete points. The hook and loop fasteners are placed in these areas of abutment, thereby firmly connecting the flat electronic toll pass 14 to the contoured flexible support substrate 24.

The area of the flexible support substrate 24 is at least as large as the area of the abutment surface of the electronic toll payment pass 14. Accordingly, once the electronic toll payment pass 14 is attached to the flexible support substrate 24, the bottom of the electronic payment pass 14 cannot be seen from a person viewing the front of the vehicle's windshield 12.

The flexible support substrate 24 is only a thin opaque sheet of paperboard or plastic. As such, the presence of the flexible support substrate 24 between the windshield 12 and the housing of the electronic

toll payment pass 14 has a negligible effect upon the functionality of the electronic toll payment pass 14.

Referring to Fig. 3, a slightly different version of the mounting device 30 is shown. The embodiment  
5 shares many of the same features as does the embodiment of Fig. 2, accordingly, the same reference numerals are used to identify the same parts.

In the embodiment of Fig. 3, two side walls 32 extend backward from the back surface of the flexible  
10 support substrate 24. The distance between the side walls 32 is at least as large as the length of the housing of the electronic toll payment pass 14.

Accordingly, when the electronic toll payment pass 14 is attached to the flexible support substrate 24 with  
15 the two sets of hook and loop strips 28, 29, the side walls 32 extend over the sides of the housing of the electronic toll payment pass 14. Consequently, even when a person is looking through the windshield 12 of the vehicle from a side angle, the housing of the  
20 electronic toll payment pass 14 cannot be seen.

Referring to Fig. 4, a third embodiment of the present invention mounting device 40 is shown. In this



embodiment, a display image 42 is printed on a removable insert 44. The shown embodiment includes a pocket structure 46. The pocket structure 46 has a front surface 47 and a back surface 48, wherein a pocket is defined between the front surface 47 and the back surface 48. The front surface 47 of the pocket structure 46 is transparent. The back surface 48 of the pocket structure 46 can be either transparent or opaque. The front surface 47 and back surface 48 of the pocket structure 46 can be manufactured to be either rigid or flexible.

The front surface 47 of the pocket structure 46 is not joined to the back surface 48 of the pocket structure 46 along at least one side edge.

Accordingly, an insert 44 with a printed display image 42 can be added into the pocket structure 46 along this edge. In the shown embodiment, the open edge is the top edge. However, it should be understood that either the side edges or the bottom edge can be open in alternate embodiments.

The insert 44 with the display image 42 can be a photograph, drawing or any other image printed onto

paper. The insert 44 can be selectively changed by simply removing the insert 44 from the pocket structure 46 and replacing it with another.

5 A clear adhesive is applied to the exterior of the front surface 47. The adhesive is covered with a removable protective cover 49 that prevents the adhesive from drying. The protective cover 49 is removed to expose the adhesive and enable the exterior of the front surface 47 to be adhesively attached to  
10 the inside of the vehicle's windshield.

A first set of hook and loop strips 28 are provided. The first set of hook and loop strips 28 attach to the exterior of the back surface 48. A second set of hook and loop strips 29 are provided.  
15 The second set of hook and loop strips 29 are adhesively attached to the housing of the electronic toll payment pass 14 in positions that correspond to the positions of the first set of hook and loop strips 28 on the back surface 48.

20 With the second set of hook and loop fasteners 48 attached to the housing of the electronic toll payment pass 14, the electronic toll payment pass 14 can be

selectively detached and reattached to the first set of hook and loop strips 29 on the back surface 48 of the pocket structure 46. The pocket area within the pocket structure 46 is at least as large as the area of the abutment surface of the electronic toll payment pass 14. Accordingly, once the electronic toll payment pass 14 is attached to the back surface 48 of the pocket structure 46, the insert 44 in the pocket structure 46 obscures the electronic toll payment pass 14 from being seen by a person viewing the front of the vehicle's windshield.

The pocket structure 46 is only made from thin pieces of plastic with a paper insert 44 in the pocket. Such a thin structure between the windshield 12 and the housing of the electronic toll payment pass 14 has a negligible effect upon the functionality of the electronic toll payment pass at a tollbooth.

Referring now to Fig. 5, a fourth embodiment of the present invention mounting system 50 is shown. In this embodiment, a replaceable insert 52 with a display image 54 is also provided. In the shown embodiment, two nesting elements 56, 58 are provided.

The outer nesting element 56 is comprised of a transparent front surface 59 and four walls 60 that extend from the periphery of the front surface 59. The four walls 60 are connected at the corners creating an undisrupted peripheral wall.

The inner nesting element 58 is sized to fit snugly within the confines of the outer nesting element 56. The inner nesting element 58 is also comprised of a front surface 61 and four walls 62 that extend from the periphery of the front surface 61. The four walls 62 are connected at the corners creating an undisrupted peripheral wall.

An insert 52 with a display image 54 is placed in between the inner nesting element 58 and the outer nesting element 56. The display image 54 is held in place by the seating of the inner nesting element 56 within the confines of the outer nesting element 58. The display image is visible through the transparent front surface 59 of the outer nesting element 56. The face of the front surface of the outer nesting element 56 can be coated with an adhesive. However, in the shown embodiment, segments of double-sided tape 66

are used to illustrate that there is more than one way to adhere the present invention to the glass of a windshield.

The walls 62 of the inner nesting element 58

5 define an area that corresponds to the size of the housing of the electronic toll payment pass 14.

Accordingly, when the electronic toll payment pass 14

is mounted within the inner nesting element 58 with

the two sets of hook and loop strips 28, 29, the side

10 walls of both the inner nesting element 58 and outer nesting element 56 extend over the sides of the

housing of the electronic toll payment pass 14.

Consequently, even when a person is looking through

the windshield of the vehicle from a side angle, the

15 housing of the electronic toll payment pass 14 cannot be seen.

It will be understood that all of the embodiments of the present invention illustrated and described are

merely exemplary and that the present invention can be

20 practiced in a variety of different ways other than

what is shown. For example, the shape and size of the

housing of the electronic toll payment pass may vary

depending upon the manufacturer. Certainly in years to come, the size of electronic toll payment passes will decrease. Consequently, it will be understood that the present invention mounting device can be varied in shape and size to match the configuration of the electronic toll payment pass. All such modifications and alternate embodiments are intended to be covered by the scope of the claims presented below.

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